

# THE MINERAL INDUSTRIES OF DENMARK, THE FAROE ISLANDS, AND GREENLAND

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## DENMARK

Denmark's industrialized market economy, which depended on exports of food and energy and imports of raw materials, grew by only 1.2% in terms of gross domestic product (GDP) in 2003. Its standard of living was among the highest in the world with a per capita GDP of \$39,152 in purchasing power parity. The country lacked economically exploitable metallic mineral resources but had abundant energy resources in the North Sea. It mined such industrial minerals as chalk, diatomaceous earth, limestone, and sand and gravel. The United States was Denmark's largest non-European trading partner mostly in nonenergy commodities (U.S. Department of State, 2004).

The Danish Energy Authority (DEA) approved plans for the development of a number of oilfields and investments of \$1.3 billion in 2003. Despite a high level of exploration activity, the oil companies in Denmark failed to find new reserves to outweigh the oil and gas production during 2003 (Rigzone.com, 2003<sup>1</sup>). The DEA approved a new venture at the Halfdan Field that would increase the country's gas and condensate reserves by about 40 million barrels.

The state-owned integrated energy company DONG A/S's Nini and Cecilie Oilfields came onstream in September. Both fields had unmanned platforms, and oil was piped to DONG's Siri platform for processing and tanker loading. The new fields were expected to produce a combined 25,000 barrels per day (bbl/d) in 2003 and 30,000 bbl/d in 2004. Interests in Nini were DONG (40%), Denerco Oil (30%), and RWE Dea AG (30%). Cecilie was owned by Denerco (61%), DONG (22%), and RWE Dea (17%) (Petroleum Economist, 2003b).

Under an agreement signed by DONG and the European Commission in April, DONG undertook to provide open and nondiscriminatory access to its gas pipeline by January 1, 2004. DONG also agreed to give up its right of first negotiation to buy any new volumes of gas discovered by the Dansk Undergrunds Consortium (DUC), which included the A.P. Moller-Maersk Group, ChevronTexaco Corp., and the Royal Dutch/Shell Group. DONG agreed to sell 150 million cubic meters per year of gas to Goteborg Energi of Sweden, which operated a combined heat and power facility at Rya (Petroleum Economist, 2003a).

The DUC (50%) and DONG (50%) planned to build a 100-kilometer (km) gas pipeline to the Netherlands' offshore F/3 platform from DUC's Tyra Gasfield at a cost of \$155 million. This would give Denmark's gas producers a new export market. Startup of the pipeline was planned for fall 2004. A.P. Moller-Maersk would operate the pipeline (Petroleum Economist, 2003b).

The European Investment Bank approved a loan of \$157 million to finance the world's largest wind farm south of Horns Rev off the Danish coast in the North Sea. The project comprised 80 wind turbines, each with a capacity of 2 megawatts (MW), and would increase Denmark's renewable wind-power-generating capacity by 8%. Elsam Kraft was the main producer and supplier of electricity in western Denmark (Alexander's Gas & Oil Connections, 2003§).

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Rigzone.com, 2003 (June 4), Denmark sets new production record for 2002, accessed June 12, 2003, at URL [http://www.rigzone.com/news/article.asp?a\\_id=6886](http://www.rigzone.com/news/article.asp?a_id=6886).

## Major Source of Information

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<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited sections.

## **FAROE ISLANDS**

The Faroese economy performed strongly as a result of increased fishing activities and high export prices. The islands have no significant mineral resources. Initial discoveries of oil could give potential for eventual oil production and a more diversified economy. The Faroese Government initiated the process toward greater independence from Denmark. Danish subsidy amounted to about 6% of the Faroese GDP in 2003.

An oil consortium led by Amerada Hess Corp. of the United States, DONG, ChevronTexaco, and OMW Corp. found natural gas and petroleum reserves in a 170-meter (m) interval in an area that is located 25 km on the British side of the border between the Shetland Islands of the United Kingdom and the Faroe Islands and 30 km north of two major oilfields. Whether this new discovery will be commercially viable may not be known for several years. The Faroe Islands' oil administration granted four more drilling permits to Agip S.p.A. of Italy; the company was expected to begin test operations on the islands in the next 3 years (Alexander's Gas & Oil Connections, 2003a§).

ENI Denmark BV planned to plug and abandon the Marimas exploration well on Faroes License 002 in the Atlantic. The well encountered good reservoir-quality sandstones but only traces of hydrocarbons. The owner of the license was Faroe Petroleum Ltd. The first two test drillings by Statoil ASA of Norway and British Petroleum also found no oil. The second licensing round was to open in the summer of 2004 (Oil & Gas Journal, 2003).

The Ministry of Petroleum's second licensing round would include the Faroese continental shelf within 200 nautical miles. It would award the exploration licenses near yearend 2004. Test wells drilled in the first licensing round established that the Faroese continental shelf had a geologic structure that was favorable to entrapment of petroleum (Alexander's Gas & Oil Connections, 2003b§).

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Alexander's Gas & Oil Connections, 2003a (January 10), British oil find may be promising for Faroe Islands, accessed January 24, 2003, at URL <http://www.gasandoil.com/goc/discover/dix30200.htm>.

Alexander's Gas & Oil Connections, 2003b (October 17), Faroe prepares for second licensing round, accessed November 13, 2003, at URL <http://www.gasandoil.com/goc/news/nte34215.htm>.

## **GREENLAND**

Greenland is a self-governing administrative division of Denmark and has had increasing autonomy. About one-half of Greenland's Government revenues came from grants from the Danish Government and were an important supplement to its GDP; tourism also contributed to the GDP. The country engaged in hydrocarbon and mineral exploration activities. Mineral exploration was focused on base metals, diamond, gold, industrial minerals, iron, nickel, and platinum-group metals.

Nalunaq Gold Mine AS approved the key civil engineering contracts to construct required infrastructure for mining and shipping of the ores at the Nalunaq gold project in southern Greenland; the project was 67% owned by Crew Development Corp. of Canada. The largest single contract, which was the delivery of a turnkey camp complex for 70 people, was awarded to RC Enterprise Service ApS of Qaqortoq in southern Greenland. The contract also covered all mobilization, construction, earthworks, water supply, and wastewater treatment, and installation of a 400-MW powerplant. The contract to construct and prepare the anchor systems for the barges and bulk carriers was awarded to Dykkerselskabet Viking A/S of the capital city Nuuk. Viking was to supply and construct the conveyor system and ship loader and mobilize and install the 91-m barge that will be used as a support for the ship loader facility. The remaining contracts to be finalized included the mining and shipping and the processing agreements. The construction work had started and the camp and harbor facilities were expected to be fully operational in September. Mining operations were scheduled to begin thereafter (Crew Development Corp., 2003a).

Crew signed a memorandum of understanding with Rio Narcea Gold Mines Ltd. of Spain regarding the processing of ore from the Nalunaq gold mine. A new mine plan would allow for full-scale mining at a rate of from 420 to 450 metric tons per day (t/d) to be reached during the first quarter of 2004. The Nalunaq ore would be processed in four batches of from 35,000 to 40,000 metric tons per year. The initial gold production was expected to exceed 4,000 kilograms in the first 12 months of operation. Rio Narcea had one of Europe's most modern ore-processing and gold recovery plants, which had a capacity of 2,000 t/d and used a combination of gravity and carbon-in-leach processing (PrimeZone Media Network, 2003§).

Crew acquired 100% of mineral rights to the Seqi olivine deposit, which is located 90 km north of Nuuk. Seqi is a large and homogeneous olivine deposit with up to 97% olivine. The inferred resources derived from drillings to about 50-m depth were estimated to be 46 million metric tons (Mt). Gravimetric studies indicated a resource in excess of 100 Mt. The company planned additional limited drilling in August and a feasibility study of a production rate of from 1.5 million to 2 million metric tons per year (Crew Development Corp., 2003c).

Crew signed an agreement with Minelco AB (a subsidiary of LKAB of Sweden) to develop a bankable feasibility study of the Seqi olivine project. Minelco had an option to buy 51% of the project by carrying all capital expenditures related to the development of a

mining operation as defined by the study. Crew would own 49% of a new company and be the preferred operator. Olivine would be used extensively in iron pellet production (Crew Development Corp., 2003b).

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- Crew Development Corp., 2003b, Crew secures industrial partner for Seqi olivine project: Vancouver, British Columbia, Canada, Crew Development Corp. news release, July 9, p. 1.
- Crew Development Corp., 2003c, Crew secures mineral rights to Seqi olivine deposit in Greenland: Vancouver, British Columbia, Canada, Crew Development Corp. news release, April 24, p. 1.

### **Internet Reference Cited**

- PrimeZone Media Network, 2003 (September 9), Memorandum of understanding signed for the processing of Nalunaq ore, accessed September 10, 2003, at URL [http://www.primezone.com/pages/news\\_releases.mhtml?d=44822](http://www.primezone.com/pages/news_releases.mhtml?d=44822).

### **Major Source of Information**

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TABLE 1  
DENMARK: ESTIMATED PRODUCTION OF MINERAL COMMODITIES <sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003
Aluminum metal, secondary	14,000	16,000	18,000	18,000	18,000
Cement, hydraulic	1,926,000 <sup>2</sup>	2,009,000 <sup>2</sup>	2,047,000 <sup>r, 2</sup>	2,010,000	2,030,000
Chalk	40,000	400,000	1,859,000	1,900,000	1,900,000
Clays:					
Fire clay	20	25	25	25	25
Kaolin	2,500	2,500	2,500	2,500	2,500
Other	6,000	6,500	6,500	6,000	6,000
Moler, extracted                      thousand cubic meters	185	234	231	230	232
Gas:					
Manufactured                      million cubic meters	1,500	1,500	1,500	1,500	1,500
Natural:					
Gross                      do.	9,600	9,700	8,200	8,100	8,100
Marketable                      do.	7,000	7,100	7,330	7,300	7,300
Iron and steel, metal, steel:					
Crude                      thousand metric tons	748 <sup>2</sup>	803 <sup>2</sup>	746 <sup>2</sup>	392 <sup>2</sup>	-- <sup>2</sup>
Semimanufactures                      do.	600	549 <sup>2</sup>	625 <sup>2</sup>	600	300
Lime, hydrated and quicklime	115,000	115,000	115,000	114,000 <sup>r</sup>	115,000
Natural gas plant liquids                      thousand 42-gallon barrels	45,000	46,000	47,000	46,700 <sup>r, 2</sup>	46,000
Nitrogen, N content of ammonia	1,600	1,600	1,600	1,600	1,600
Peat	200,000	247,000	287,000	290,000	295,000
Petroleum:					
Crude                      thousand 42-gallon barrels	84,000	87,860 <sup>2</sup>	88,130 <sup>2</sup>	94,600 <sup>r, 2</sup>	95,000
Refinery products:					
Liquefied petroleum gas                      do.	1,600	1,700	1,700	1,660 <sup>r, 2</sup>	1,700
Gasoline                      do.	30,000	30,000	30,000	27,800 <sup>r, 2</sup>	28,000
Naphtha                      do.	1,200	1,300	1,300	-- <sup>r, 2</sup>	--
Jet fuel                      do.	1,800	2,000	2,000	1,950 <sup>r, 2</sup>	2,000
Kerosene                      do.	100	100	-- <sup>r, 2</sup>	-- <sup>r, 2</sup>	--
Distillate fuel oil                      do.	28,000	28,200	28,200 <sup>r</sup>	28,500 <sup>r, 2</sup>	28,800
Refinery gas                      do.	16,000	17,000	1,700	1,640 <sup>r, 2</sup>	1,600
Lubricants                      do.	300	300	-- <sup>r, 2</sup>	-- <sup>r, 2</sup>	--
Residual fuel oil                      do.	13,000	13,000	13,000	13,100 <sup>r, 2</sup>	13,200
Petroleum coke                      do.	60	60	-- <sup>r, 2</sup>	-- <sup>r, 2</sup>	--
Total                      do.	92,100 <sup>r</sup>	93,700 <sup>r</sup>	77,900 <sup>r</sup>	74,650 <sup>r, 2</sup>	75,300
Phosphates, crude, gross weight	1,200	1,300	1,300	1,300	1,400
Salt, all forms	600,000	605,000	600,000	600,000	605,000
Sand and gravel:					
Onshore                      thousand cubic meters	18,000	28,066 <sup>2</sup>	26,684 <sup>2</sup>	27,000	27,000
Offshore                      do.	5,000	715 <sup>2</sup>	700	700	600
Total                      do.	23,000	28,781 <sup>2</sup>	27,384 <sup>2</sup>	27,700	27,600
Of which sand, industrial (sales)                      do.	50	479 <sup>2</sup>	488 <sup>2</sup>	490	500
Stone:					
Dimension (mostly granite)	26,000	27,000	27,000	25,000	26,000
Limestone:					
Agricultural	700,000	700,000	700,000	700,000	700,000
Industrial	250,000	250,000	250,000	250,000	250,000
Sulfur, byproduct	10,000	10,500	10,500	11,000	12,000

Estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through June 22, 2004. Estimated data are based on sales of domestically produced mineral commodities.

<sup>2</sup>Reported figure.